

**Lesson 6-3** (pp. 298–303)**Standard Form**

<b>Lesson Objectives</b> <b>1</b> Graph equations using intercepts <b>2</b> Write equations in standard form	<b>NAEP 2005 Strand:</b> Algebra <b>Topic:</b> Patterns, Relations, and Functions <b>Local Standards:</b> _____
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**Vocabulary and Key Concepts****Standard Form of a Linear Equation**

The standard form of a linear equation is  $Ax + By = C$ , where  $A$ ,  $B$ , and  $C$  are real numbers, and  $A$  and  $B$  are not both zero.

The  $x$ -intercept is the  $x$ -coordinate of the point where a line crosses the  $x$ -axis.

**Example**

**1 Finding  $x$ - and  $y$ -Intercepts** Find the  $x$ - and  $y$ -intercepts of  $2x + 5y = 6$ .

**Step 1** To find the  $x$ -intercept, substitute 0 for  $y$  and solve for  $x$ .

$$2x + 5y = 6$$

$$2x + 5(0) = 6$$

$$2x = 6$$

$$x = 3$$

The  $x$ -intercept is  $3$ .

**Step 2** To find the  $y$ -intercept, substitute 0 for  $x$  and solve for  $y$ .

$$2x + 5y = 6$$

$$2(0) + 5y = 6$$

$$5y = 6$$

$$y = \frac{6}{5}$$

The  $y$ -intercept is  $\frac{6}{5}$ .

**Check Understanding**

1. Find the  $x$ - and  $y$ -intercepts of  $4x - 9y = -12$ .

$-3; \frac{4}{3}$

### Examples

#### 2 Graphing Lines Using Intercepts Graph $3x + 5y = 15$ using intercepts.

**Step 1** Find the intercepts.

$$3x + 5y = 15$$

$$3x + 5(\boxed{0}) = 15 \quad \text{Substitute } \boxed{0} \text{ for } y.$$

$$\boxed{3}x = \boxed{15} \quad \text{Solve for } x.$$

$$x = \boxed{5}$$

$$3x + 5y = 15$$

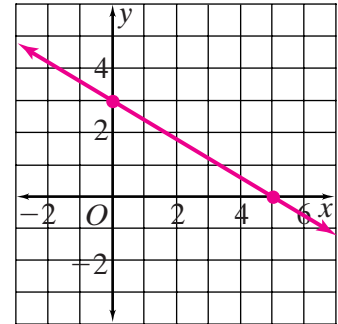
$$3(\boxed{0}) + 5y = 15 \quad \text{Substitute } \boxed{0} \text{ for } x.$$

$$\boxed{5}y = \boxed{15} \quad \text{Solve for } y.$$

$$y = \boxed{3}$$

**Step 2** Plot  $(\boxed{5}, 0)$  and  $(0, \boxed{3})$ .

Draw a line through the points.



#### 3 Transforming to Standard Form Write $y = \frac{2}{3}x + 6$ in standard form using integers.

$$y = \frac{2}{3}x + 6$$

$$\boxed{3}y = \boxed{3}\left(\frac{2}{3}x + 6\right) \quad \text{Multiply each side by } \boxed{3}.$$

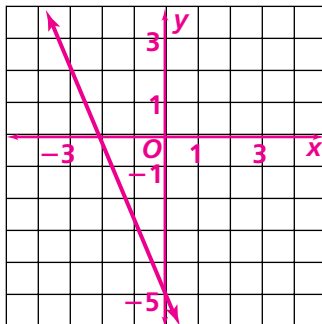
$$\boxed{3}y = \boxed{2}x + \boxed{18} \quad \text{Use the Distributive Property.}$$

$$\boxed{-2x} + 3y = \boxed{18} \quad \text{Subtract } \boxed{2x} \text{ from each side.}$$

The equation in standard form is  $\boxed{-2x + 3y = 18}$ .

### Check Understanding

2. Graph  $5x + 2y = -10$  using the  $x$ - and  $y$ -intercepts.



3. Write  $y = -\frac{2}{5}x + 1$  in standard form using integers.

$$\boxed{2x} + \boxed{5y} = \boxed{5}$$

### Example

- 4 Applying Standard Form** Write an equation in standard form to find the number of hours you would need to work at each job to make a total of \$130.

Job	Amount paid per hour
Mowing lawns	\$12
Delivering newspapers	\$5

**Define** Let  $x$  = the hours mowing lawns.

Let  $y$  = the hours delivering newspapers.

**Relate**  $\boxed{\$12 \text{ per h mowing}}$  plus  $\boxed{\$5 \text{ per h delivering}}$  equals  $\boxed{\$130}$

**Write**  $\boxed{12x}$  +  $\boxed{5y}$  =  $\boxed{\$130}$

The equation in standard form is  $\boxed{12x + 5y = 130}$ .

### Check Understanding

- 4. Data Analysis** Write an equation in standard form to find the number of minutes someone who weighs 150 lb would need to bowl and walk to burn 250 calories.

$$4x + 5y = 250$$

Activity by a 150-lb Person	Calories Burned per Minute
Bicycling	10
Bowling	4
Hiking	7
Running 5.2 mi/h	11
Swimming laps	12
Walking 3.5 mi/h	5

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